REMARKS/ARGUMENTS

Introduction:

Claims 2, 3, 6-11, 18, 21, 44, 48, and 55-58 are amended, and claims 1, 4, 5, 12-17, 19, 20, 22-43, 45-47, 49-54, and 59-63 are or were previously canceled. Claims 2, 3, 6-11, 18, 21, 44, 48, and 55-58 are now pending. Applicants respectfully request reconsideration of the application.

Priority:

In the Office Action, the PTO acknowledged "applicant's claim for benefit of the filing date of a continuation-in-part of the prior application." Applicants have not, however, claimed benefit of the prior application (US application serial no. 09/938,789) as a continuation-in-part application. Rather, the Application Data Sheet filed October 23, 2003 states that the instant application is a continuation of the prior application, and the PTO's PAIR system identifies the instant application as a continuation of the prior application.

Double Patenting:

In response to the double patenting rejection, Applicants will file a terminal disclaimer after all other issues in the application are resolved. Applicants respectfully assert, however, that the PTO's statement that the claims of the other patent anticipate the claims of the instant application is in error.

Rejections under 35 U.S.C. § 101:

Claims 2, 3, 6-18, 21, 44, 46, 48, 55-58, and 63 were rejected under 35 U.S.C. § 101 as being directed to non-statutory subject matter. Applicants respectfully traverse this rejection.

Initially, Applicants note that the pending claims are tied to a machine. In fact, the pending claims are directed to a machine: an "apparatus comprising computer hardware." For this reason alone, the claims are statutory.

Moreover, in making the foregoing rejection, the PTO stated that the recitation in the independent claims of "selecting a path resulting in creation of a trace . . . refers to a decision and no tangible result." The rejection thus appears to be based on an alleged failure of the claims to meet the tangible result requirement.

Initially, it is important to understand that the tangible result requirement does not necessarily mean that the claim creates or transforms a physical (i.e., a tangle) product. Rather, the MPEP describes the "tangible result" requirement as follows:

> "The tangible requirement does not necessarily mean that a claim must . . . must operate to change articles or materials to a different state or thing. However, the tangible requirement does require that the claim must recite more than a 35 U.S.C. 101 judicial exception, in that the process claim must set forth a practical application of that judicial exception to produce a real-world result. *Benson*, 409 U.S. at 71-72, 175 USPQ at 676-77 (invention ineligible because had 'no substantial practical application.'). '[A]n application of a law of nature or mathematical formula to a process may well be deserving of patent protection.' *Diehr*, 450 U.S. at 187, 209 USPQ at 8 (emphasis added); see also *Corning*, 56 U.S. (15 How.) at 268, 14 L.Ed. 683 ('It is for the discovery or invention of some practical method or means of producing a beneficial result or effect, that a patent is granted . . .'). In other words, the opposite meaning of 'tangible' is 'abstract.'" (MPEP § 2106, paragraph entitled "Tangible Results" at the top of the right column on page 2100-12.)

A claim directed to a computer related invention, like claim 1 of the instant application, thus meets the tangible result requirement if the claim sets forth a practical application that produces a useful result. As discussed in more detail below, independent claim 2 meets the foregoing test and, for at least that reason, meets the tangible result requirement.

As recited, the apparatus of claim 2 includes "means for receiving computer readable information representing a proposed physical layout of a routing space of an electronics system including locations of a first electronic component, a second electronic component, and obstacles within said proposed physical layout." An example is shown in Figure 2, which shows an example of such a computer rendered representation of a routing area 202 with electronic components 212, 214, 216, 218, 222, 224, 226, and 228 and obstacles 204, 206, 208. As discussed in the specification, the routing area 202 and electronic components and obstacles can represent a routing area in a real-world electronics product such as a printed circuit board, a probe card, an integrated circuit, etc. (Specification paragraphs [0023]-[0025].) Among other elements, the apparatus of claim 2 also includes "means for creating a computer generated representation of a trace within said proposed physical layout of said routing space that connects the first electronic component to the second electronic component and passes between said pair of obstacles by selecting a path through said adjusted array of nodes, said trace comprising said path." The apparatus of claim 2 thus creates a computer generated representation of a trace

within the routing space that connects the first electronic component with the second electronic component and passes between a pair of the obstacles. As is known to those of ordinary skill in the field, such a computer generated representation of a trace connecting two electronic components and avoiding obstacles is useful for a number of possible reasons. For example, persons of skill in the field can use such a computer generated representation of the trace to make a real trace on the real-world electronics product connecting the two electronic components. The result produced by the apparatus of claim 2—a computer generated representation of a trace connecting two electronic components that avoids obstacles in a routing space of an electronics product—is thus a practical application that produces a useful, real-world result: the computer generated representation of the trace can be used to make the trace on the actual electronics product. For at least the foregoing reasons, claim 2 meets the tangible results requirement. Applicants therefore assert that claim 2 is statutory and request that the rejection under 35 USC § 101 be withdrawn.

Independent claim 18 recites "means for creating a computer generated representation of a trace within said proposed physical layout of said routing space by selecting a path through said adjusted array of nodes, said trace comprising said path" and is therefore statutory at least for reasons similar to some of the reasons discussed above with respect to claim 2.

Applicants note that another Examiner recently allowed claims in a commonly owned, related application. That application, which includes claims directed to a machine that manipulates representations of traces in "information representing a proposed physical layout of a routing space in an electronics system," recently issued as US Patent No. 7,444,623. Applicants urge the Examiner to review those claims and the file history of that application. Applicants note that the Examiner who allowed the claims in US Patent No. 7,444,623 determined that those claims were directed to statutory subject matter.

Rejections under 35 U.S.C. 103(a):

Claims 2, 3, 6-18, 21, 44, 46, 48, 55-58, and 63 were rejected under 35 U.S.C. 103(a) as obvious in view of Vaughn (U.S. Publication No. 2001/0038612) and Chapman (U.S. Patent No. 7,065,729). Applicants have canceled independent claim 12 and the claims that depend therefrom, mooting the rejection of those claims. Applicants otherwise traverse this rejection.

As Applicants pointed out in the previous Amendment, claim 1 recites "means for adjusting within said proposed physical layout said initial array of nodes, said means for adjusting including locating a particular number of nodes between a pair of said obstacles, said particular number corresponding to a maximum number of traces that can pass between said obstacles, each of said nodes positioned between said pair of said obstacles representing a possible location of one of said traces that can pass between said obstacles." In particular, Applicants argued in the previous Amendment that Vaughn does not place a number of nodes between a pair obstacles that equals the maximum number of traces that can pass between the obstacles. In response, the PTO pointed to paragraph [0157] of Vaughn and the zone quanta concept described in that paragraph.

The zone quanta concept, however, does not involve placing nodes between a pair of obstacles that equals the maximum number of paths permitted between the obstacles. Rather, as described in paragraph [0157] of Vaughn, the zone quanta concept merely breaks the routing space into small pieces Vaughn calls zones. Because each zone is smaller than the whole routing area, there are necessarily fewer traces to be routed and fewer obstacles in a zone than in the whole routing area. This is all that the portion of paragraph [0157] quoted by the PTO appears to mean: "the number of routing path segments to be processed and the number of obstacles to routing the path segments are reduced ***because of the small size of the zone quanta***" (emphasis added). Nothing in paragraph [0157] teaches or suggests that a number of nodes be placed between a pair of obstacles that is equal to the permissible number of traces that can pass between the obstacles. Indeed, merely reducing the number of paths segments in no way teaches or suggests placing a number of nodes between obstacles that equals the number of permissible paths between the obstacles.

Moreover, paragraph [0157] expressly states that the zone quanta concept does not "eliminate all . . . ***path density issues***" (emphasis added). This appears to mean that the zone quanta concept does nothing to reduce the number of possible paths through a zone—much less between obstacles in the zone—to the number of permitted paths through the zone. The only reasonable conclusion to draw from the foregoing teaching is that Vaughn does not set the number of nodes between an obstacle equal to the number of paths that are permitted in the space between the obstacles.

For at least the foregoing reasons, Vaughn does not teach or render obvious the above-

quoted features of claim 2. The PTO did not rely on Chapman for teachings that would make up for the above-discussed deficiencies in Vaughn. At least for these reasons, claim 2 and the claims that depend from claim 2 are patentable over Vaughn and Chapman.

Independent claim 18 recites "means for applying forces to ones of said nodes, wherein a magnitude of one of said forces applied to one of said nodes ***is proportional to a proximity of said one of said nodes to one of said obstacles***," and claim 18 further recites "means for moving within said proposed physical layout each of said ones of said nodes in accordance with said force applied to said one of said nodes." In rejecting claim 18, the PTO identified only paragraphs [0112] and [0182] of Vaughn as teaching the foregoing features of claim 18. Neither paragraph [0112] nor [0182], however, describes applying a force to a node that is proportional to a proximity of the node to an obstacle.

Paragraph [0112] of Vaughn describes "virtual nodes" that can be used to define such things as a point at which two paths meet at right angles. Although Vaughn states that such virtual nodes can be moved and even discarded, Vaughn does not teach or provide even a hint of a suggestion that a force is applied to such a virtual node that is proportional to the proximity of the virtual node to an obstacle much less moving the virtual node in accordance with such a force. Paragraph [0182] merely describes the process of generating the path G to G' in Figure 14E such that the G to G' path does not cross the E to E' path or the B to B' path. The nodes that define the G to G' path are positioned so that the G to G' path does not cross the E to E' path or the B to B' path. There is no teaching, however, or even a hint of a suggestion of assigning to any of the nodes that define the G to G' path forces that are proportional to the proximity of the node to an obstacle (e.g., one of path E to E' or path B to B') and then moving the nodes in accordance with the assigned forces. Rather, Vaughn appears merely to place the node to avoid crossing the E to E' path or the B to B' path. For at least these reasons, Vaughn does not teach or render obvious at least "means for applying forces to ones of said nodes, wherein a magnitude of one of said forces applied to one of said nodes ***is proportional to a proximity of said one of said nodes to one of said obstacles***" and "means for moving within said proposed physical layout each of said ones of said nodes in accordance with said force applied to said one of said nodes."

For at least the foregoing reasons, Vaughn does not teach or render obvious the above-quoted features of claim 18. The PTO did not rely on Chapman for teachings that would make up for the above-discussed deficiencies in Vaughn. At least for these reasons, claim 18 and the

claims that depend from claim 18 are patentable over Vaughn and Chapman.

Conclusion:

In view of the foregoing, Applicants submit that all of the claims are allowable and the application is in condition for allowance. If at any time the Examiner believes that a discussion with Applicants' attorney would be helpful, the Examiner is invited to contact the undersigned at (801) 426-2106.

Respectfully submitted,

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